

Evaluation of Burn Care Infrastructure and Stakeholder Opinions: A Cross-Sectional Study at the National Institute of Burn and Plastic Surgery, Bangladesh

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Abstract:

Background: Having the right facilities and enough skilled staff is crucial for giving proper burn care, especially in places with limited resources. The National Institute of Burn and Plastic Surgery (NIBPS) is a significant step forward for Bangladesh's healthcare system, aiming to tackle the serious issue of burn injuries.

Objective: To evaluate the available infrastructure for burn care at the NIBPS and to assess the perceptions and challenges reported by its healthcare providers.

Methods: We ran a cross-sectional study at NIBPS from January to December 2019. To gather information, we interviewed 20 service providers, mostly doctors, and used an observational checklist for the facilities. We analyzed the data on manpower, workload, working environment, training, and the availability of both physical and technical resources using descriptive statistics.

Results: We discovered a serious shortage of human resources, with 95% of the providers saying they didn't have enough staff. We did have some essential equipment, like burn tanks and advanced imaging, but unfortunately, it wasn't working. Plus, dietary and ambulance services were missing. On a positive note, 80% of the providers had burn-specific training, and 95% were sticking to protocols. The main recommendation from 70% of the providers was to urgently bring in skilled workers.

Conclusion: The NIBPS has a major operational issue due to a lack of staff and malfunctioning equipment. We really need to hire specialized personnel and get all our medical equipment up and running if we want to provide proper burn care.

Keywords: Burn care, Health resources, Health workforce, Medical equipment, Need assessment.

Introduction

Burn injuries are a serious global health issue, and they hit low- and middle-income countries (LMICs) especially hard. In these areas, things like poverty, using open flames for cooking, and crowded living situations really raise the chances of getting severe burns. At the same time, these

factors make it tough to get the right medical care for those injuries^{1,2,3}. Dealing with serious burns really requires a specialized and resource-heavy approach. It's best handled in dedicated burn units where they have top-notch surgical tools, skilled nurses, and thorough rehab services all working together⁴.

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Setting up these specialized centers is really important for low- and middle-income countries looking to cut down on burn-related deaths and health issues. Bangladesh, where around 365,000 individuals experience burn injuries each year, is a prime example of a country that desperately needs better, centralized burn care⁵ In reaction to this issue, the National Institute of Burn and Plastic Surgery (NIBPS) opened its doors as the biggest burn care facility in South Asia. It's a clear sign of the nation's serious commitment to tackling this public health crisis with better infrastructure. Still, looking back at healthcare growth in areas with limited resources, there's a recurring problem: the difference between building facilities and making sure they actually work effectively⁶.

The success of a burn center isn't just about having fancy buildings or the right equipment. It's really about how well three key elements work together: a capable and adequate team, reliable technology and supplies, and smooth operational systems. If any of these parts are lacking, even the most high-tech facility can end up being useless, turning into what people call 'empty-shell' institutions that can't provide the care they're supposed to⁷ When it comes to burn care, this issue is really serious. If there aren't enough staff, it puts patient safety at risk, affects how wounds are treated, and can lead to problems with infection control. Plus, if the equipment doesn't work—like imaging machines or specialized burn tanks—then diagnosing issues takes longer and treatment options get limited. On top of that, not having support services like proper dietary aid or dependable ambulance transport really hampers overall patient care⁸ To really grasp how ready the new national institute is, we need to look past just the physical assets and dive into a thorough evaluation of how prepared it is operationally, especially from the viewpoint of the people actually providing care. Even though the NIBPS is crucial, there's not much research out there that systematically checks its infrastructure readiness or takes into account the experiences of healthcare workers on the ground.

Existing studies from Bangladesh have primarily focused on epidemiological patterns of burn injury^{5,9} with limited inquiry into the health system's capacity to manage these cases. The perceptions of doctors—who navigate daily clinical realities within the institute—offer an invaluable, ground-level lens

through which to identify systemic bottlenecks, resource gaps, and operational challenges. This study set out to take a two-pronged look at the NIBPS. The goals were pretty straightforward: on one hand, we wanted to check if the key physical resources, equipment, and support services needed for burn care were available and working well; on the other hand, we aimed to understand what the doctors working in the institute think, what challenges they're facing, and any suggestions they might have. The idea is to use what we find to come up with solid, evidence-based recommendations. That way, we can help make sure this important national resource meets its full potential in providing top-notch burn care.

Methods:

From January to December 2019, we carried out a detailed cross-sectional study at the National Institute of Burn and Plastic Surgery (NIBPS) in Dhaka, Bangladesh. The aim was to assess both the infrastructure and the views of providers.

Study population: The study population included two components: 1) Service providers: Permanent doctors employed at NIBPS. A total of 20 doctors were selected via purposive sampling. 2) Facility audit: The physical infrastructure and equipment of the institute itself.

Inclusion and exclusion criteria: We welcomed providers who met a few key criteria: they needed to be permanent employees at NIBPS, have at least six months of experience at the institute, and give their informed consent. Anyone who was on leave or didn't want to participate was not included.

Study procedure and instruments: We gathered data using two tools. First, we conducted face-to-face interviews with a semi-structured questionnaire that looked into provider demographics, their views on staffing, workload, training, and any suggestions they had. Then, the researcher used a pre-tested observational checklist to assess the availability and performance of essential facilities, including reception areas, physical spaces, equipment, investigations, and support services.

Data analysis: We analyzed the data using SPSS version 23. To give an overview, we used descriptive stats like frequencies and percentages to summarize all the categorical info we gathered from the provider interviews and the facility checklist. This helped us create a profile of resource availability and the providers' views.

Results:

The study involved 20 doctors from service providers and a thorough audit of the facilities. The data showed that most of the providers (70%) were men, with the largest group (35%) falling in the age range of 31 to 35 years. In terms of roles, 35% were post-graduate trainees, 30% were medical officers, and 15% were assistant professors; the rest included junior consultants, associate professors, and assistant registrars. Notably, 70% of these doctors had been at the institute for less than three years. In terms of challenges, a significant 95% of doctors felt there weren't enough service providers to handle patient care demands, while 90% described their workload as excessive. Surprisingly, despite these pressures, 60% viewed their working conditions as healthy, and 90% thought cooperation from patient attendants was good. In practice, 80% of doctors confirmed they had received specialized training in managing burn patients, and a remarkable 95% said they used established protocols for patient management. When it came to managing unusual cases, 90% felt there were sufficient facilities available. However, the audit revealed some serious gaps between what resources were supposed to be there and how well they functioned. While basic reception areas and essential physical facilities like signposts, separate toilets, emergency beds, and operating theatres were present, a significant issue was that Intensive Care Unit (ICU)

facilities were found to be unavailable. Most essential medical equipment was present, but the burn tank was not working. Diagnostic investigations faced bigger challenges. Pathological and microbiological services were running, but all key diagnostic machines – like ultrasonography, X-ray, MRI, CT scan, ECG, and Echocardiogram – were there but non-operational, mainly because of a shortage of technical staff. The physiotherapy department also had non-functional wax bath facilities. Moreover, the support services were lacking: dietary services were outsourced to another hospital and not provided by NIBPS directly, and while ambulance services were listed, they were non-operational due to not having enough staff. The human resource situation was particularly troubling. Out of a sanctioned total of 473 doctor positions, only 64 were filled, which means 409 positions are vacant (an 86.4% vacancy rate). The nursing situation was even worse, with 54 nurses working against 671 sanctioned positions, leading to a vacancy rate of 92% (617 vacant). Support staff was nearly nonexistent, with 874 out of 884 positions unfilled (98.9% vacancy). Providers had clear suggestions for improvement. Most notably, 70% of doctors stressed the urgent need to hire enough skilled manpower. Following that, 25% called for more support staff, while 10% emphasized the importance of having modern equipment and logistics.

Table 1: Profile of service provider doctors (N=20)

Characteristic	Category	Number	Percentage
Age group (Years)	<31	5	25
	31-35	7	35
	36-40	5	25
	>40	3	15
Gender	Male	14	70
	Female	6	30
Designation	Post-graduate trainee	7	35
	Medical officer	6	30
	Assistant professor	3	15
	Junior consultant	2	10
	Associate professor / Asst. registrar	2	10

Table II: Work experience and perceptions of service providers

Variable	Category	Number	Percentage
Length of service	<3 years	14	70
	3-4 years	3	15
	>4 years	3	15
Cooperation from attendants	Cooperative	18	90
	Not cooperative	2	10
Received special burn training	Yes	16	80
	No	4	20
Follows clinical protocols	Yes	19	95
	No	1	5

Table III: Provider perceptions of manpower, workload, and environment

Perception	Category	n	%
Adequacy of manpower	Adequate	1	5
	Not adequate	19	95
Perceived workload	Normal	2	10
	Excessive	18	90
Working environment	Healthy	12	60
	Not healthy	8	40
Facilities for unusual situations	Adequate	18	90
	Not adequate	2	10

Table IV: Gap analysis of key facility availability and functionality

Facility category	Status	Key findings
Critical physical facility	Unavailable	Intensive care unit (ICU)
Major equipment	Present, not functional	Burn tank
diagnostic Investigations	Present, not functional	Ultrasonography, X-ray, MRI, CT scan, ECG, echocardiogram
Support services	Outsourced/Non-functional	Dietary service (outsourced), ambulance (non-functional)
Physiotherapy equipment	Present, not functional	Wax bath

Table V: Human resource vacancy status at NIBPS

Staff category	Sanctioned post	Posted	Vacant	Vacancy rate (%)
Doctors	473	64	409	86.4
Nurses	671	54	617	92
Support staff	884	10	874	98.9

Table VI: Top suggestions from providers for service improvement

Suggestion	Number	Percentage	Rank
Recruit adequately skilled manpower	14	70	1
Recruit more supportive staff	5	25	2
Ensure modern equipment & logistics	2	10	3
Improve the working environment	1	5	4
Automated record keeping	1	5	4

Discussion:

This study provides a stark look at how ready a key national burn institute actually is, pointing out a significant disparity between what its infrastructure could offer and how well it functions. The results highlight a major hurdle in developing health systems in low- and middle-income countries: moving from just building facilities to creating a service that is operational and sustainable^{6,11}. The NIBPS really shows a dedication to burn care, but at the moment, it feels more like a shell of what it could be. The facilities and tools just aren't doing their job due to severe shortages of staff and a lack of proper support⁷.

What's really concerning is the huge shortage of staff. We've got vacancy rates at 86.4% for doctors, 92.0% for nurses, and a staggering 98.9% for support staff, which means the institute is running on fumes. So, it's no surprise that 95% of the providers said they don't have enough staff, and 90% complained about being overloaded with work. This level of understaffing is risky for patient safety, it affects how often and well we can provide wound care, and it raises the chances of infections related to healthcare – especially critical for burn patients who are already at high risk^{3,12}. The high workload also places providers at risk of burnout, which can further degrade care quality and staff retention, creating a vicious cycle¹³. It's interesting to note that even with all these serious limitations, a lot of doctors still feel positively about certain aspects of their work.

For instance, 90% said patient attendants were helpful, 80% had special training, 95% stuck to clinical protocols, and 90% felt ready to handle unusual situations. This mix might show how dedicated they are and how they manage to cope, but it also points to a troubling normalization of crises. While it's great that so many are sticking to protocols, it raises concerns about how effective these complex processes can be with so few staff available. The audit of the facility adds to the problem. The fact that advanced diagnostic tools like ultrasound, MRI, and CT machines, along with crucial therapeutic

equipment like burn tanks, aren't working seriously constrains clinical decision-making and treatment options. As a result, there's a heavy reliance on outside referrals or less-than-ideal care pathways. This aligns with findings from other low- and middle-income countries, where high-tech equipment that was either donated or bought often just sits unused because there aren't enough trained people to operate it, maintenance agreements, or essential supplies¹⁴.

Not having a working ICU, proper dietary services, or an ambulance is a huge problem for patient care. For someone with burns, they really need close monitoring, the right nutrition, and reliable transport. If there are holes in these services, it really takes away from the institute's ability to claim they offer complete care^{15,16}. The feedback from providers really emphasizes the basics. The biggest concern – hiring enough skilled workers (70%) – hits right at the heart of the issue. This should be the top priority for those in charge. The second point, about needing more support staff (25%), acknowledges that doctors and nurses can't do their jobs well without a solid administrative and logistical setup. Right now, the NIBPS is in a tough spot, trying to make the most of what it has. Moving ahead, it's clear what needs to happen. Policymakers should switch from focusing on finishing construction to actually making operations work.

Bringing in a large number of specialized burn surgeons, nurses, anesthetists, and technicians needs to happen right away. At the same time, we need a quick plan to assess and get all the installed equipment up and running, while also ensuring there are budgets for maintenance and supplies. Until we tackle these key issues of staff and equipment, the institute will just be a missed opportunity, and its potential to improve burn care in Bangladesh won't be realized^{17,18}. It's pretty obvious what the takeaway is for future health infrastructure projects: from the start, the budget and timeline for staffing and operational support should be factored in, rather than just being an afterthought^{19,20}.

Limitations:

This study has some limitations due to its cross-sectional design, which means we can't draw direct cause-and-effect conclusions. Plus, the small, intentionally selected sample of providers does reflect the overall workforce, but it makes it tough to generalize the findings. Also, while the facility checklist looked at whether the equipment was available, it didn't really evaluate how often it was used or its quality.

Conclusion:

The NIBPS is really struggling right now, facing a huge gap in its operations. It has some advanced facilities but is held back by a lack of skilled staff and equipment that just doesn't work. To actually become a functional burn care center instead of just being a name, we need to quickly hire specialized personnel and get all the medical equipment up and running. It's crucial to put sustainable plans in place to close the big gap between what we can do and the care we provide to patients.

Recommendation:

Right now, we need to quickly recruit a lot of burn surgeons, nurses, and technicians. It's also crucial to get a skilled technical team in place to ensure all the diagnostic and treatment equipment is up and running. Plus, we need to set up in-house dietary services and functional ambulance services as soon as possible.

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